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STRICTLY NONBLOCKING MULTICAST MULTI-STAGE NETWORKS

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ABSTRACT OF DISCLOSURE

A three-stage network is operated in strictly nonblocking manner in accordance with the invention includes an input stage having r_1 switches and n_1 inlet links for each of r_1 switches, an output stage having r_2 switches and n_2 outlet links for each of r_2 switches. The network also has a middle stage of m switches, and each middle switch has at least one link connected to each input switch for a total of at least r_1 first internal links and at least one link connected to each output switch for a total of at least r_2 second internal links, where $m \geq 2 * n_1 + n_2 - 1$. In one embodiment, each multicast connection is set up through such a three-stage network by use of at most two switches in the middle stage. When the number of inlet links in each input switch n_1 is equal to the number of outlet links in each output switch n_2, and $n_1 = n_2 = n$, a three-stage network is operated in strictly nonblocking manner in accordance with the invention if $m \geq 3 * n - 1$. Also in accordance with the invention, a three-stage network having more middle switches than $2 * n_1 + n_2 - 1$ is operated in strictly nonblocking manner even if some multicast connections are set up by using more than two middle switches as long as each connection has available links into at least two middle switches and there are always at least $n_1 - 1$ unused links from each input switch to middle switches, after each connection is set up.